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Occupational Health & Safety

Hantavirus Disease

Guidelines for Protecting Workers and the Public

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Hantavirus disease

Summary

Hantavirus disease is a rare, but potentially fatal infection spread by deer mice and possibly by other rodents. It is transmitted to people when they inhale airborne particles contaminated by the saliva or excretions of infected rodents. Controlling rodents, identifying sources of infection, cleaning buildings and worksites and minimizing exposures will reduce the risk of infection. Flu-like or pneumonia-like symptoms following potential exposures to sources of infection should be promptly reported to a doctor for treatment.

The disease

It begins as a flu-like illness. The initial symptoms include fever, muscle aches, cough, headaches, nausea and vomiting. As the disease worsens, pneumonia symptoms may develop. Fluid builds up in the lungs, making it difficult to breathe. Heart function may also be affected. Death may occur at this stage.

The initial symptoms of the disease may appear from one to six weeks after the exposure, with an average of from two to three weeks. Once the initial symptoms appear, the disease can progress rapidly and become life-threatening within a few days.

Reasn for concern

As of June 2007, eighteen people in Saskatchewan have been diagnosed with Hantavirus infections. Approximately one-half of the cases in Saskatchewan involved exposures in a rural or farm setting. In Canada, 64 cases have been reported to date. Approximately one-third of these have been fatal. Cases are largely restricted to western Canada. Besides the Saskatchewan cases, there have been nine cases in British Columbia, two in Manitoba, and 34 in Alberta. A proportion of Saskatchewan deer mice tested had evidence of the disease. Although the disease is rare, it is advisable to take common sense precautions to prevent Hantavirus and other rodent-borne infections.

For the most current information on the number of cases, check the web version of this publication on the following website:
http://www.labour.gov.sk.ca/safety/publications/publications.htm .

Carrier

In western North America, deer mice (*Peromyscus maniculatus*) are the primary carriers of the Hantavirus that causes a respiratory disease in people. There are a few reports of other rodents having evidence of Hantavirus infections, but in western North America, the Hantavirus is largely restricted to deer mice.

Deer mice are found throughout most of Saskatchewan in a variety of indoor and outdoor habitats in rural and semi-rural areas. They are less common in urban areas. Deer mice have characteristically large eyes and ears and a bicoloured body that distinguish them from field or house mice. The upper side of their tail and body is dark brown or grey and the underside is white.

Outdoors, deer mice construct nests in stumps, under logs, in hollow tree cavities or in abandoned bird nests. They may enter buildings in cold weather where they may damage food stuffs and furnishings.

Sources of infection

The Hantavirus can be present in infected rodents' saliva, urine and droppings and in materials contaminated with them. How long the Hantavirus survives in the environment is not yet known. It can survive to some extent in dried saliva or excretions.

Hantavirus is transmitted to people when they inhale airborne particles contaminated by the saliva or excretions of infected rodents. It may also be possible that humans are infected after:

- direct contact of broken skin or eye membranes with contaminated materials
- eating or drinking contaminated food or water
- being bitten by an infected rodent

There is no evidence that the virus can be spread from arthropods (e.g., insects and ticks), cats, dogs or infected people.

Risk groups

Farmers, grain handlers, hikers, campers and people in occupations with unpredictable or incidental contact with rodents or their nesting materials are at risk. Such occupations include telephone installers, oil workers, plumbers, electricians, pest control officers and certain construction, maintenance and wildlife workers.

Treatment

People who develop a fever or respiratory illness within six weeks of potential exposure to sources of infection should immediately seek medical attention. The physician should be informed of the potential exposure and of the suspected risk of Hantavirus disease. Persons with the disease will require intensive, supportive care to treat the symptoms.

Preventive measures

1. Control rodents
2. Clean buildings and worksites before use
3. Minimize exposure to sources of infection

1. Control rodents

Remove rodents from infested areas and buildings

Use traps – Trap rodents in buildings with spring-loaded mouse traps. Bait the traps with dried fruit or peanut butter mixed with oats or cheese. Be sure the bait is securely attached to the trip pedal, or the trap may not spring when the food is removed. Set traps at right angles to the walls where the rodents are known to travel, with the bait side of the trap towards the wall. Bait the traps without setting them for the first few nights.

Remove dead rodents safely – Spray the trap with a disinfectant prior to removing the rodent. Disinfectants (such as a 1:10 dilution of Javex or another household bleach, 70% alcohol, or most general purpose household disinfectants) are effective in killing the Hantavirus. Make sure the label indicates the product is a disinfectant. Wearing gloves, transfer the rodent to a disinfectant solution and soak before transferring it to a plastic bag. Close the bag with a twist tie, then place it in a second bag and seal it with a twist tie. Dispose of the bagged rodent by placing it in the regular garbage. Disinfect the area (do not reuse the disinfectant solution used to soak the rodent). Wash your hands and exposed skin surfaces thoroughly with soap and water.

Contact professionals about severe infestations – If you have a severe infestation, consider consulting a pest control company about approved rodenticides or professional extermination.

Use traps rather than poisons – Traps are preferred over rodenticides. Rodenticides take longer to kill the rodents, leaving them free to further contaminate areas. Carcasses of poisoned animals left in unknown locations can still be sources of infection. Inappropriately used rodenticides can harm children, pets or wild animals. If rodenticides are used, set them in covered bait stations in areas where children and pets cannot reach them.

Encourage predators, such as cats.

Keep rodents out

- Seal holes (with expanding foam or caulking, and steel wool) that are larger than a half centimetre (one-quarter inch) around buildings and screened-in crawl spaces. These holes include openings for utility lines, ducts and vents.
- Seal access points to the ventilation systems of vehicles that are stored in potentially mouse-infested areas (e.g. fields).
- For trailers seal up holes and gaps in the skirting, between the trim and metal siding, around pipes and ducts, around roof vents and around the trailer tongue.
- Repair cracks in cement footings and foundations.
- Build sheds on concrete slabs.
- Enclose wood foundations with metal roof flashing buried 15 centimetres (six inches) deep and extending 29 centimetres (12 inches) above ground. On new construction sites consider a raised foundation.
- Use spring-loaded mouse-traps continuously in infested areas using small amounts of peanut butter as bait.
- If traps cannot be used, use rodenticides approved for exterior use in covered bait stations. For further information on appropriate rodenticides call the Agriculture Knowledge Centre at 1-866-457-2377.

Eliminate food sources, hiding and living places

- Store food, grain and feed in rodent-proof containers.
- Put pet food and water away at night.
- Clean up left-over food, or food residue (e.g., crumbs).

- Clear brush and grass from around foundations (ideally more than 30 metres away from building). Keep grass cut.
- Reduce rodent shelters such as abandoned cars, discarded furniture, tires, rubbish and wood piles.
- Place wood piles, bricks, stones, or other materials more than 30 metres away from buildings.
- Keep exterior doors and windows closed, unless protected by tight-fitting screens.
- Reduce potential nesting materials such as boxes, clothes, blankets, etc.
- Repair any leaks and insulate pipes where condensation may form.
- Mouse-proof garbage cans by elevating them and/or using well-fitting lids.

2. *Clean buildings and worksites before use*

Properly clean and disinfect rodent-infested cabins and other enclosed shelters before use. When opening cabins and other seasonal buildings, check for signs of infestation before use. For example, check areas where food was stored or areas that may have been used for nesting (cabinets, drawers, closets). Signs of infestation include the rodents themselves, droppings, urine stains, gnawing damage, burrows, rodent sounds, odours, nests or tracks on dusty surfaces.

Make sure that you:

- Ventilate closed buildings or areas for 30 minutes before the start of cleaning.
- Wear a proper, well-fitting filter mask. Refer to *Appendix A: Guidelines for selecting and using filter masks in rodent-infested areas*. See *Appendix B* for a list of suppliers.
- Wear eye goggles when cleaning overhead or when it is necessary to clean heavily contaminated areas using dry methods such as dusting, sweeping, vacuuming or air hosing.
- Wear plastic or rubber disposable gloves where skin contamination is unavoidable. For severe infestations or for prolonged periods of cleaning, consider using disposable coveralls, head covers and rubber boots or disposable shoe covers.
- Personal protective equipment should be decontaminated or safely disposed of after use. Non-disposable coveralls should be laundered on-site, if possible. If not, coveralls should be immersed in liquid disinfectant until they can be washed.
- Spray debris with a disinfectant solution (such as a 1:10 dilution of Javex, another household bleach or most general purpose disinfectants) and scoop it into double plastic bags. Close the bags with a twist-tie and put them in the regular garbage.

- Spray or soak dead rodents in a disinfectant solution before placing them in double plastic bags for disposal.
- Clean the area using wet methods such as wet-wiping, mopping or using a water hose wherever possible. Use the disinfectant solution for cleaning. Avoid using dry methods (e.g., dusting, sweeping, vacuuming or air-hosing). Vacuum machines equipped with a high efficiency particulate air (HEPA) filter can be used. For carpets, use a commercially available carpet disinfectant. Add the disinfectant to your regular carpet shampoo, according to the manufacturer's instructions.
- Disinfect countertops, cabinets, drawers, and other non-porous surfaces.
- Disinfect and clean gloves before removing them. Disinfect eye goggles and rubber boots. Launder or dispose of potentially contaminated garments immediately after use. Use gloves when handling heavily contaminated laundry.
- Wash your hands and exposed skin surfaces thoroughly with soap and water.

3. Minimize exposure to sources of infection

Personal protective equipment – Personal protective equipment may need to be used in situations where it is not practical to eliminate sources of infection (e.g., in large warehouses and barns) and the activity may expose workers to sources of infection.

Hikers and campers – Outdoors, hikers and campers may come into contact with rodents, their nesting material and dust contaminated with rodent excreta. To reduce exposure, use tents with floors and avoid sleeping on the bare ground. Set up tents well away from wood piles or garbage sites. Avoid coming into contact with rodents and rodent burrows or disturbing dens.

Duties of employers

The employer must determine if a worksite is infested with rodents and identify which workers are likely to be exposed to rodents, their saliva, excreta or contaminated materials. If a worker is expected to clean heavily infested buildings (e.g. abundant dead mice, feces and/or nests), the employer must develop a written plan in consultation with the occupational health committee, worker health and safety representative, or workers (where no committee or representative is required). The plan must include elements listed in section 85 of *The Occupational Health and Safety Regulations, 1996*

and be shared with workers who may be exposed. Once a plan is developed, the employer must take steps to ensure it is implemented and that workers are trained on the contents of the plan.

The plan must address:

- informing workers of the disease risk, how it is transmitted and the signs and symptoms of the disease;
- infection control procedures, including clean-up and disinfection procedures and the use of engineering controls, protective clothing and equipment;
- worker training;
- the need to seek medical attention if a worker feels they have developed symptoms of the disease; and
- the investigation and documentation of exposure incidents.

For more information

Call the Occupational Health and Safety Division of Saskatchewan Labour for workplace concerns. For non-workplace concerns contact your local Medical Health Officer or Public Health Inspector.

Appendix A:

Guidelines for selecting and using filter masks in rodent-infested areas

These guidelines are to be used:

- when cleaning buildings and worksites where the space is enclosed and where there is evidence of mice, or
- when required to work or otherwise be present in enclosed, dusty areas (such as large warehouses or barns) where it is not practical to eliminate sources of infection.

How to select the appropriate filter or filter mask

Select HEPA filter cartridges or filter masks that are approved by the National Institute for Occupational Safety and Health (NIOSH). Look for one of the following approval ratings on the filter or the packaging: N100; R100; or P100.

Types of filter masks

- disposable filter masks
- half-face cartridge masks with replaceable filter cartridges
- powered air-purifying respirators (supplied-air pumped through a filter)

Note: If you have been using a pesticide half-face mask respirator, you need to replace the prefilter and carbon filter with one of the filter cartridges described above.

How to use the filter mask

- For occasional cleaning, a disposable mask should be adequate in most cases.
- The mask must be tight-fitting. Facial hair prevents an adequate seal.
- Test the fitting of the respirator using the manufacturer's instructions.
- A disposable mask can be reused a few times if it is not contaminated or dirty and if its structural integrity is maintained.
- A filter cartridge should be replaced according to supplier recommendations; otherwise, it should be replaced when the user notices difficulty breathing through it.
- After use, remove the cartridge, clean the respirator with detergent and water, disinfect with a mild disinfectant, then rinse and air dry. Tape the inlet opening of the cartridge and swab cartridge surfaces with a disinfectant-soaked wipe. Store it in a plastic bag, in an area free from contamination.
- The user must be trained how to use, clean and maintain the respiratory protective device and be informed about its limitations.
- Use additional protective measures and equipment (such as gloves, eye goggles, coveralls, head covering and boots) if extensive exposure to dust is expected. Extensive exposure may be unavoidable because of the nature of the workplace or the work to be done, or where severe infestation is suspected.

Appendix B:

Examples of suppliers of HEPA filters and filter masks

These filters and masks can be purchased from Saskatchewan Wheat Pool Farm Service Centres or the suppliers of safety equipment listed below.

Note: This list is not exhaustive and those firms listed are not necessarily endorsed by the Occupational Health and Safety Division.

- Mid North Safety
- Century Vallen
- Safety Supply Canada (Safety Supply products can be purchased at any Acklands Limited Distribution Outlet)
- Levitt Safety Ltd.
- Macmor Industries Ltd.
- Saskatoon Fire Protection
- TS&M Supply
- Fire and Safety Centre
- SIM-CON Oilfield Equipment Ltd.
- Zee Medical Service Co.
- Triod Supply Ltd.

Check the yellow pages in the telephone book under *Safety Equipment and Clothing* for the addresses and telephone numbers of these and other suppliers.

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Regina Inquiry: 787-4496
6th Floor,
400-1870 Albert Street
S4P 4W1
Toll Free: 1-800-567-7233

Saskatoon Inquiry: 933-5052
8th Floor,
122-3rd Avenue North
S7K 2H6
Toll Free: 1-800-667-5023

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